intensity. It appears that damage was confined to uprooted trees, broken power and communication lines, plate-glass windows, a few flimsy structures, roofs, signs, cornices, etc., with damage to crops negligible, although some citrus fruit was damaged and seedbeds flooded and damaged. A few small boats were beached and damaged, but small craft generally had been moved to safe anchorage well in advance of the storm. A man was drowned at Cedar Key when the rowboat in which he was attending the anchorage of fishing boats capsized in the rough sea. This was the only death attributed to the storm. In the northwestern counties from about Tallahassee to Pensacola, considerable damage to crops by flooding and wind resulted. * * *

After about 4 days in Alabama, where disastrous flooding rains fell, the remnants of the disturbance moved over the northern portion of the Jacksonville district, attended by heavy rains and some flooding along the southern and eastern slopes of the Appalachian Mountains. A tornado on the periphery of the disturbance is reported to have killed one person in North Carolina, but otherwise no very strong winds attended the disturbance in its northeastern movement in this district.

In reporting on conditions in the vicinity of Apalachicola, Forecaster Dyke at New Orleans says:

Winds of gale force occurred as far inland as De Funiak Springs, in Walton County and about 26 miles from the coast. As the stronger winds were offshore, no high tides occurred west of Apalachicola. Tides were above normal from Apalachicola northeastward to St. Marks but not high enough to cause appreciable damage.

The principal damage was to electric power, telephone, and telegraph lines. There was some damage to roofs. Most of the boats were safely placed, but a few unguarded small boats were sunk at Apalachicola. Damage of $2,000 to a dock warehouse at Port St. Joe is reported.

In Virginia, Maryland, Delaware, New Jersey, southeastern Pennsylvania, and extreme southeastern New York, heavy rains attended the remnants of the storm while it was moving northeastward during the period from the 18th to the 20th. At several places the records of rainfall in 24 hours were broken. Tuckerton, N. J., had 14.81 inches.

Timely reports, especially those received from stations in the Bahamas and from merchant ships, enabled the forecasters to chart the storm center with exceptional accuracy. Advices and warnings were issued frequently and well in advance of the storm.

Chart XIII shows the track of the disturbance and the situation on the morning of August 12 when the center was moving across the extreme northeastern Gulf of Mexico.

NOTES AND REVIEWS

DAVID BRUNT. *Physical and Dynamical Meteorology.* Second edition, 428 pp., Cambridge; at the University Press. New York; The Macmillan Co. 1939.

The first edition of this volume was published five years ago, in 1934; it remains the only general textbook and manual of mathematical meteorology in the English language. In preparing the second edition, many portions of the text have been revised, rewritten, or amplified.

The book is devoted entirely to the physical theory of the dynamic and thermodynamic phenomena in the earth's atmosphere, so far as possible in mathematical form. The comparatively small amount of descriptive material enters in only an incidental way; and there is no attempt at the discussion of weather forecasting, climatic phenomena, atmospheric optics, or other branches of the physics of the air.

The first chapter contains a brief summary of the normal distribution of temperature, pressure, and winds over the globe, the distribution of temperature in the upper air, and other basic facts of observation for which a satisfactory mathematical theory must account. The succeeding chapters discuss the fundamental static equations for the atmosphere, atmospheric stability, the thermodynamic theory of condensation, and atmospheric thermodynamics in general. Three chapters are then devoted to the role of radiation and absorption in meteorological phenomena, including the theory of the stratosphere.

The general equations of motion of the atmosphere referred to the surface of the rotating earth are then formulated, the circulation theorems developed, and the theory of the gradient wind constructed. A chapter is devoted to the dynamical theory of surfaces of discontinuity; a chapter on the general theory of turbulence is followed by a lengthy chapter on the role of atmospheric turbulence in the transfer of heat and momentum, and its effects on atmospheric stability and the variation of wind velocity with height, together with applications to the theory of evaporation into the atmosphere.

After a brief chapter in which the dynamical equations are made the basis for a classification of winds, the transformations and dissipation of energy in the atmosphere are treated, together with the theory of vortical motion in the atmosphere.

The remaining chapters of the book contrast strongly with the preceding part, in the almost complete absence of mathematical equations and in consisting predominantly of descriptive material or only generalized qualitative physical reasoning. These chapters deal with the phenomena of air masses, the frontal structure of cyclones, a review of various theoretical conceptions of cyclones and their structure in the upper air, anticyclones, and finally the general circulation of the atmosphere.—*Edgar W. Woolard.*

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By AMY P. LESHER

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SOLAR OBSERVATIONS

[Meteorological Research Division, Edgar W. Woolard in charge]

SOLAR RADIATION OBSERVATIONS, AUGUST 1939

By Charles M. Lennahan

Measurements of solar radiant energy received at the surface of the earth are made at eight stations maintained by the Weather Bureau, and at nine cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrheliometric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Washington, D. C., Madison, Wis., Lincoln, Nebr.) and at the Blue Hill Observatory at Harvard University. Occasional observations of sky polarization are taken at the Weather Bureau stations at Washington and Madison.

The geographic coordinates of the stations, and descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data, obtained up to the end of 1936, will be found in the Monthly Weather Review, December 1937, pp. 415 to 441; further descriptions of instruments and methods are given in Weather Bureau Circular Q.

Table 1 contains the measurements of the intensity of direct solar radiation at normal incidence, with means and their departures from normal (means based on less than 3 values are in parentheses). At Madison and Lincoln the observations are made with the Marvin pyrheliometer; at Washington and Blue Hill they are obtained with a recording thermopile, checked by observations with a Marvin pyrheliometer at Washington and with a Smithsonian silver disk pyrheliometer at Blue Hill. The table also gives vapor pressures at 8 a. m. (75th meridian time) and at noon (local mean solar time).

Table 2 contains the average amounts of radiation received daily on a horizontal surface from both sun and sky during each week, their departures from normal and the accumulated departures since the beginning of the year. The values at most of the stations are obtained from the records of the Eppley pyrheliometer recording on either a microammeter or a potentiometer.

Direct radiation intensities averaged above normal for August at Madison and Lincoln, and slightly below normal at Washington.

Total solar and sky radiation was above normal at all stations except Miami and Riverside. Data for four of the regular reporting stations are not included because for various reasons the data were not available. These data will be published as soon as they are available.

Table 1.—*Solar radiation intensities during August 1939*

[Gram-calories per minute per square centimeter of normal surface]

WASHINGTON, D. C.

Date	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass A. M.					Air mass P. M.				Local mean solar time
	e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Aug. 1	15.11		0.62	0.71	0.90	1.24					16.79
Aug. 2	16.20			.28	.54						17.37
Aug. 3	17.96			.52	.72						17.96
Aug. 5	10.59		.64	.76							11.38
Aug. 7	15.11		.61	.70							12.68
Aug. 10	12.68		.65	.82	1.05	1.29					10.59
Aug. 11	13.13			.75	.88	1.14					14.10
Aug. 12	17.37				.68						15.65
Means			.64	.64	.78	1.22					
Departures			−.04	−.12	−.16	−.03					

MADISON, WIS.

Date	8 a.m. e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	Noon e
Aug. 3	10.97	0.60	0.71	0.92	1.13	1.33	1.10				9.83
Aug. 4	9.14	.77	.84	1.02	1.18						8.18
Aug. 9	8.48	.84	.95	1.06	1.24	1.37	1.10				7.57
Aug. 14	12.68	.61	.71	.84	1.03	1.30	.94				12.24
Aug. 16	13.61	.68	.61	.80	1.02	1.22					12.68
Aug. 23	9.83			.96	1.15	1.35					10.21
Aug. 24	9.83		.91	1.07	1.21	1.37					10.21
Aug. 25	11.38		.84	1.01	1.18	1.38					12.24
Aug. 26	11.81		.77	.95	1.14	1.33					11.81
Means		.70	.79	.96	1.14	1.33	1.05				
Departures		−.03	−.01	.03	.04	.04	.00				

LINCOLN, NEBR.

Date	8 a.m. e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	Noon e
Aug. 2	16.20		0.84	0.95	1.15		1.22	1.08	0.95		9.47
Aug. 3	10.59		.94	1.07	1.25		1.06	.96	.84		7.57
Aug. 4	10.97		.90	1.02	1.20		1.17	.96			8.48
Aug. 17	13.13	0.63	.73	.87	1.08						13.13
Aug 18	12.24		.73	.88	1.07		1.20	1.03	.90	0.77	10.97
Aug. 21	7.29	.85	.98	1.13	1.25		1.22	1.02	.90	.77	6.76
Aug. 22	8.48						1.28				8.18
Aug. 23	7.87	.79	.90	1.04	1.19		1.02				7.87
Aug. 24	9.14						.92				11.38
Aug. 26	11.38				.70						15 11
Aug. 29	12.24	.50	.63	.77	.98						14.60
Aug. 30	13.13	.52	.65	.84	1.04		.99	.74	.59	.45	12.68
Means		.66	.81	.95	1.09		1.12	.96	.84	.66	
Departures		−.02	.03	.04	.00		.05	.08	.11	.01	

* Extrapolated.